

IN THE CLAIMS:

Please CANCEL claim 52 without prejudice to or disclaimer of the recited subject matter.

Please AMEND claims 53, 54, 57-59 and 82, as follows. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

1-52. (Cancelled)

53. (Currently Amended) An exposure apparatus comprising:

as a reticle stage and/or a wafer stage, a stage apparatus having a stage movable at least on a long stroke along a first direction and a short stroke along a second direction, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in the first direction into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in the second direction into second reference and measurement beams, a third optical unit which is arranged on the stage and irradiates a third laser beam along a third direction for measuring a position of the stage in the third direction perpendicular to each of the first and second directions, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and reflects the second measurement beam, a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams.

54. (Currently Amended) A semiconductor device manufacturing method comprising the steps of:

installing, in a semiconductor manufacturing factory, manufacturing apparatuses for performing various processes, the manufacturing apparatuses including an exposure apparatus which includes as a reticle stage and/or a wafer stage, a stage apparatus having a stage movable at least in a long stroke along a first direction and a short stroke along a second direction, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in the first direction into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in the second direction into second reference and measurement beams, a third optical unit which is arranged on the stage and irradiates a third laser beam along a third direction for measuring a position of the stage in the third direction perpendicular to each of the first and second directions, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and reflects the second measurement beam, a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams.

55. (Previously Presented) The method according to claim 54, further comprising:

connecting the manufacturing apparatuses by a local area network; and

communicating information about at least one of the manufacturing apparatuses between the local area network and an external network outside the semiconductor manufacturing factory.

56. (Previously Presented) The method according to claim 55, further comprising performing one of (i) accessing a database provided by a vendor or user of the exposure apparatus via the external network to obtain maintenance information of the manufacturing apparatus by data communication, and (ii) performing production management by data communication between the semiconductor manufacturing factory and another semiconductor manufacturing factory via the external network.

57. (Currently Amended) A semiconductor manufacturing factory comprising:
manufacturing apparatuses, for performing various processes, the manufacturing apparatuses including an exposure apparatus which includes as a reticle stage and/or a wafer stage a stage apparatus having a stage movable at least in a long stroke along a first direction and a short stroke along a second direction, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in the first direction into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in the second direction into second reference and measurement beams, a third optical unit which is arranged on the stage and irradiates a third laser beam along a third direction for measuring a position of the stage in the third direction perpendicular to each of

the first and second directions, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and reflects the second measurement beam, a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams;

a local area network for connecting said manufacturing apparatuses; and

a gateway which allows the local area network to access an external network outside the factory,

wherein information about at least one of said manufacturing apparatuses can be communicated.

58. (Currently Amended) A maintenance method for an exposure apparatus which is installed in a semiconductor manufacturing factory, and includes as a reticle stage and/or a wafer stage a stage apparatus having a stage movable at least in a long stroke along a first direction and a short stroke along a second direction, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in the first direction into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in the second direction into second reference and measurement beams, a third optical unit which is arranged on the stage and irradiates a third laser beam along a third direction for measuring a position of the stage in the third direction perpendicular to each of

the first and second directions, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and reflects the second measurement beam, a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams, said method comprising the steps of:

causing a vendor or user of the exposure apparatus to provide a maintenance database connected to an external network of the semiconductor manufacturing factory;

authorizing access from the semiconductor manufacturing factory to the maintenance database via the external network; and

transmitting maintenance information accumulated in the maintenance database to the semiconductor manufacturing factory via the external network.

59. (Currently Amended) A stage apparatus comprising:

a stage movable along at least a first direction and a second direction, wherein the stage is movable in a stroke along the first direction, which is longer than a stroke in the second direction;

a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in the first direction into first reference and measurement beams;

a second optical unit which splits a second laser beam for measuring a position of the stage in the second direction into second reference and measurement beams;

a third optical unit which is arranged on the stage and irradiates a third laser beam along a third direction for measuring a position of the stage in the third direction perpendicular to each of the first and second directions; and

an interferometer which measures a position of the stage, wherein said interferometer has a first reflection unit which is arranged on the stage and measures the stage in the first direction and a second reflection unit which is arranged outside the stage and measures the stage in the second direction.

60. (Previously Presented) The apparatus according to claim 59, wherein the first and second directions are perpendicular to each other.

61. (Previously Presented) The apparatus according to claim 59, wherein said stage is movable in a third direction perpendicular to the first and second directions.

62. (Previously Presented) The apparatus according to claim 61, further comprising an irradiator for emitting a measurement beam in the third direction.

63. (Previously Presented) The apparatus according to claim 59, wherein said stage is movable in a direction around an axis perpendicular to the first and second directions.

64. (Previously Presented) The apparatus according to claim 61, wherein the position of said stage in a direction around an axis along the third direction is measured by using a measurement beam in the second direction.

65. (Previously Presented) The apparatus according to claim 59, wherein a driving mechanism for driving said stage is controlled based on a measurement result of the position of said stage.

66. (Previously Presented) The apparatus according to claim 59, wherein said stage includes a reticle stage which supports a reticle.

67. (Previously Presented) The apparatus according to claim 59, wherein the second reflection unit includes a mirror which extends in the first direction.

68. (Previously Presented) The apparatus according to claim 59, further comprising:
a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in the first direction into first reference and measurement beams;

a second optical unit which is arranged on the stage and splits a second laser beam for measuring a position of the stage in the second direction into second reference and measurement beams;

a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams; and

a second detector which detects an interference beam of the second measurement and reference beams,

wherein the first reflection unit reflects the first measurement beam, and the second reflection unit reflects the second measurement beam.

69. (Previously Presented) The apparatus according to claim 68, wherein the second detector is arranged outside the stage.

70. (Previously Presented) The apparatus according to claim 68, wherein said first and/or second optical unit makes the first and/or second reference beam and the first and/or second measurement beam interfere.

71. (Previously Presented) The apparatus according to claim 68, wherein said first and/or second detector makes the first and/or second reference beam and the first and/or second interference beam interfere.

72. (Previously Presented) The apparatus according to claim 68, wherein an incident direction of the second laser beam into said second optical unit and an irradiating direction of the second measurement beam from said second optical unit to said second reflection unit are perpendicular to each other.

73. (Previously Presented) The apparatus according to claim 68, wherein the incident direction of the second laser beam into said second optical unit is parallel to the first direction and an irradiating direction of the second measurement beam from said second optical unit to said second reflection unit is parallel to the second direction.

74. (Previously Presented) The apparatus according to claim 68, wherein the first measurement beam includes a plurality of measurement beams.

75. (Previously Presented) The apparatus according to claim 74, wherein a position of said stage in a direction around an axis perpendicular to the first and second directions is measured by using the first measurement beam.

76. (Previously Presented) The apparatus according to claim 74, wherein a position of said stage in a direction around an axis along the second direction is measured by using the first measurement beam.

77. (Previously Presented) The apparatus according to claim 68, wherein said second optical unit has a plurality of optical units on said stage.

78. (Previously Presented) The apparatus according to claim 77, wherein the position of said stage in the direction around the axis along the second direction is measured by using the second measurement beam.

79. (Previously Presented) The apparatus according to claim 77, wherein a shape of the second reflection unit is measured based on pieces of first direction position information of at least two points on said stage, and pieces of second direction position information of at least two points on said stage that are measured by using said second optical unit.

80. (Previously Presented) The apparatus according to claim 79, wherein the second direction position information on said stage that is measured by using said second optical unit is corrected based on a measurement result of the shape of the second reflection unit.

81. (Previously Presented) The apparatus according to claim 68, wherein the second reflection unit is supported at a Bessel point of the second reflection unit.

82. (Currently Amended) A stage apparatus comprising:

a stage movable at least in a long stroke along a first direction and a short stroke along a second direction; and

an interferometer which measures a position of said stage, wherein said interferometer has a first reflection unit which is arranged on said stage and measures said stage in the first direction, ~~and~~ a second reflection unit which is arranged outside said stage and measures said stage in the second direction and a third reflection unit which is arranged outside said stage and measures said stage in the third direction perpendicular to each of the first and second directions.